How to Introduce Experiential User Data: The Use of Information in Architects' Design Process

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Abstract

As architecture influences people's daily life considerably, architects need in-depth insights in people's spatial perception, needs, and desires. To be able to provide them with sufficient and suitable information on these matters we aim to investigate how architects currently use information in design, and how experiential user data could change their thinking about their projects and way of working. We conducted two focus group interviews with architects (designing healthcare buildings), each covering two parts. First, we discussed information use and knowledge generation during design. This resulted in a better understanding of a design process' iterative nature with shifts in information content, type, and use. Several nuances were identified, e.g. between using general legal information and information focused on the building's actual situation, and between obligatory and inspiring sources. Second, we presented different forms of research data, and probed participants' interest in and possible use of these. This provided insights in what information qualities architects look for while designing, identifying strengths and weaknesses. Also ideas for disseminating research results amongst architects were collected. We conclude by pointing out opportunities of using experiential user data to initiate and support changes in design practice that improve users' wellbeing, especially in healthcare buildings.

Keywords

Architecture; Design Process; Evidence; Focus group Interviews; Use of Information

Swiss architect Peter Zumthor describes architecture as "*the background for life"* (2010, p. 12). What architects design influences people's daily experience considerably. Therefore, architects need sufficient information on people's spatial perception, needs, and desires. Since "information" is a very broad term, questions rise as to which (type of) information is needed in different phases of the design process and how this is used. Designers cannot collect all the needed information by themselves. However, when researchers provide data, designers' expectations regarding these data and how they can be effectively communicated should also be explored. Therefore we addressed a twofold research question: how do architects currently use information in design, and how could experiential user data change their thinking about their projects and current way of working? In two focus group interviews we sounded out how information content, type, and use differs in different design phases, and based on these insights we tried to identify opportunities to penetrate such information more appropriately into architectural design practice. This double aim was reflected in the organisation of the interviews: a first part addressed the use of information during the design process in general, in a second part specific examples of research data were presented followed by questions on their usability and degree of fascination. The interviews were analysed based on themes found in literature, after which the generated findings were discussed against these same themes.

This provided us with a more nuanced understanding of what information is desired in what phase and how architects would like to gain access to it. These insights could inform research projects, to better match the content and type of research data with architects' needs during design and thus bring research and practice closer to each other.

(User) Informed Design in Literature

Since design tasks are ill-defined or wicked in nature (Rittel & Webber, 1973), the information necessary to solve them cannot be readily available (Cross, 1982). As the information needed to understand the problem depends upon the designer's idea for solving it, collecting information and designing is a continuous iterative process. Donald Schön (1983) argues that even if designers have a virtuous ability to string out design webs of great complexity, they still cannot handle an indefinitely expanding web. At some point during the process, (they have to come to an intermediate decision which can then become the basis for further exploration, new problem statements and new (partial) solutions. Designers continually reflect-in-action (Schön, 1983). This sort of design is described as 'knowledge-rich', meaning that the design requires designers to have a considerable amount of knowledge beyond what is provided in the problem description (Lawson, 1994). Designers have to derive knowledge from the available information the design process needs to be fed with continually. Since each phase in the design process has a different purpose and focus (Cuff, 1989), the question arises whether and how the content, type, and use of information needed in different phases differs too.

Each designer brings his/her own concerns into the process (Lawson, 1994). Sometimes these are clearly articulated; sometimes they are based on tacit knowledge architects gained through personal or professional experience. Due to some great architects' fame, we sometimes mistakenly assume their work to be entirely personal (Lawson, 1994). In reality the coming-into-being of a building is teamwork, among architects from one or more firms, between architects and other building professionals, and between architects and clients. Bryan Lawson (1994) also points out: "*It is quite likely today that those who commission buildings are not actually going to use the buildings themselves. Architects therefore must try to consider the feelings of their 'users' as opposed to their 'clients'*." Especially in the health care context, it is important that buildings meet the social, psychological, and developmental needs of those using them. Since the gap between decision makers and users is often too wide to be overcome by designers using only a personal perspective (Zeisel, 2006), experiential user data collected by researchers can play an important role when incorporated into the design process. Which data meet designer requirements, and how they can be communicated effectively are interesting research questions (McGinley & Dong, 2011).

Compared to other professionals, designers are quite specific in terms of their approach to information. They are very much attracted to information presented with maximum use of graphics and limited text. If text is presented it should be short and easily digestible (Lofthouse, 2006). Moreover, designers often feel mistrust towards data that have already been through a process of interpretation (Restrepo, 2004). This may explain why they prefer raw data in a format that is condensed to be design-relevant, allowing them to quickly pick up both overarching themes and discover depth relevant to a specific project (McGinley & Dong, 2009). Therefore, it should not come as a surprise that, to inspire designers, images made by users (*i.e.*, photographs, drawings, or handwriting) are more effective than words (Lee, Harada, & Stappers, 2000). There is indeed a need to bring information on real human experiences to life based on actual situations, not through dry representations, but through presenting experiential user data as fuller stories (McGinley & Dong, 2011). However, apart from visual sources (whether or not directly derived from users), other, it would be interesting to explore more narrative techniques to surpass designers' visual focus.

Researching Architects' Information Use: Methodology

Focus Group Interviews: Aim and Set-Up

Since design is both a personal and collective process, we looked for a technique that addressed participants' own experience but also left room for interaction. As focus group interviews are well suited to diagnose problems and to gain insights in people's way of looking at a certain theme (Stewart, 2007), we opted for this technique. To improve the chances of success we wanted the respondents to be able to communicate on the same level and being comfortable with each other (Mortelmans, 2007). Therefore we chose to organise two focus groups with a slightly different accent. The first group consisted of five architects from different firms (Table 1). Within each firm, we invited those architects who were most involved in care building projects and in collecting information for the design. This group could provide us with a broad range of approaches towards information. Each firm indeed takes a different stance as to the importance they attach to external information and how it is collected. The second group featured seven architects, each fulfilling a different role within the same architecture firm (Table 2). Since the members of this group knew each other in advance and had sometimes even been working on the same project, they shed a more nuanced light on interaction between (people working on) the different phases of the design process. Both groups of architects were working in the (health)care sector. This selection was made based on the focus of our own research in this field (Annemans, *et al*., 2011, 2012a, 2012b).

Profile	**Gender**	**Years of experience**
Company V	M	10-20
Company W	M	> 20
Company X	F	10-20
Company Y	M	10-20
Company Z	M	5-10

Table 1: Participants of the focus group with architects from different firms

Profile	**Gender**	**Years of experience**
Trainee 1	M	< 5
Trainee 2	F	< 5
Responsible concept phase	F	5-10
Responsible building phase	M	10-20
Hospital architect	F	10-20
Care architect	M	5-10

Partner at the firm	M	10-20

Table 2: Participants of the focus group at one firm

Data Collection and Analysis

Both interviews covered a general part and one specifically focussing on experiential user data, collected in the context of a study on hospital patients' spatial experience. Although the interview's main outline remained the same, some shifts in emphasis occurred between both. The interview with the group of one firm started by inventorying the different phases in the design process and what information was used in each phase. Only after a consensus was reached, more general questions were asked on which information was missing, and the reliability and management of the collected information. The group involving architects from different firms was asked to describe the importance and use of evidence in their firm. While preparing this interview architects from different firms, we decided to use the term *evidence* rather than information, staying closer to the, for architects, maybe more familiar concept of evidence-based design (EBD)[1]. However, the connotation associated with this term did not improve the communication. Therefore we gave some additional explanation and soon shifted towards the term information.

After a short break, both focus groups were presented various kinds of data on patients' spatial experience collected through ethnographic research (Annemans, *et al*., 2012a). We were mainly interested in the importance architects attached to each information type and which strengths and weaknesses they identified. These data were diverse in nature: photographs and drawings made by patients, and video recordings of hospital trajectories, capturing the experience of movement were shown and accompanied of some explanation.

Figure 1: Narrative of photographs and a drawing made by a patient, January 2011, Photograph by participant (undisclosed name for anonymity reasons)

[1] Using information, or evidence, to inform the design process, is often referred to as Evidence Based Design (EBD). This concept found its origin in the analogy with other evidence-based approaches to research and practice. Parallel with evidence-based medicine, EBD studies want to provide evidence for the healing outcome of building aspects (Ulrich et al., 2004). Architects frequently misunderstand the term. Many fear EBD to be overly prescriptive rather than informative, moreover they do not fully grasp how to assess its strength or weakness, and in what context it could be valid (Brandt, e.a, 2010). However, as clients increasingly expect architects to base design decisions on an explicit chain of knowledge that can be directly linked to facts, research data, or own field observations and also share this information with them (Hamilton, 2009), architects cannot stay behind.

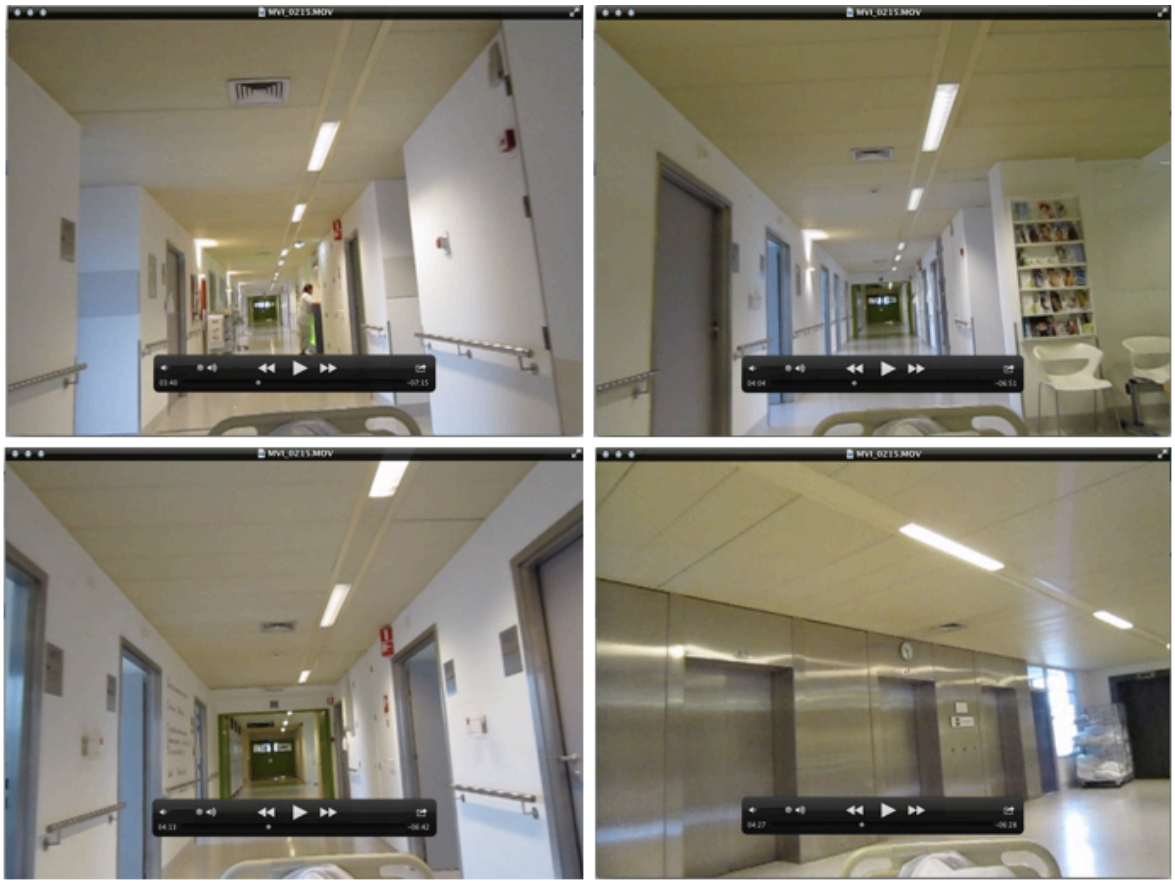
Figure 2: Video recording of hospital trajectory, July 2012, Recorded by Margo Annemans

All of these were presented as raw data (videos shown without any post processing) and accompanied by quotes from participating patients. To extend the possible ways of informing the design process, we added a biographical text from a cancer patient, Maggie Keswick and the translation of this text into a rather atypical architectural brief (written for architects designing a Maggie's Cancer Caring Centre) (see Annemans et al., 2012b). Subsequently participants were asked to comment on the different information types, what they found interesting, whether and how it could inspire them, and what they thought was missing in or could be complementing the presented data.

The audiorecordings of both interviews were transcribed verbatim. The transcripts were analysed through coding. To establish a list of representative codes, we started by open coding followed by axial coding (Mortelmans, 2007). Throughout this process previously established topics grounded in literature (Creswell, 2003) were kept in mind. As the focus group interviews were mainly explorative in nature, the results will be used as a basis to set up further ethnographic research in hospitals (aiming to collect the type of data architects are longing for) and to be able to come to selective coding of follow up interviews with architects on the use and communication of information in the design process.

In what follows, the material shown to the architects, combined with other material regarding spatial experience in care settings, will be referred to as *(research) data*. These can become part of the large amount of sources architects consult while design, all of which we address as *information*. Finally, just collecting this information will not be enough for architects to actually work with it. It will need to infiltrate their daily practice to a point that if forms part of both their tacit and explicit *knowledge*.

Architects on Experiential User Data: Findings

Information in the Design Process

When asked about which information they used, architects from both groups mentioned the site, design brief, cooperation with engineers or other support services, client, architectural examples (mostly called "references") and feedback from former projects. However, the group consisting of one firm paid considerably more attention to how client and user could differ and how they could find entries into users' experience, e.g., by participating in daily activities taking place in an existing building with a similar program as the one considered, testimonies in online movies or texts, workshops, or exhibitions. Still, although sporadically these efforts were already made, the partner at the firm mentioned that real user involvement was still lacking in the workshops they organise: *"[… the people who take part are not people from our field] a psychiatrist, or a doctor, or a geriatric, a user we should involve more, but well, maybe not someone with dementia, but maybe relatives of someone with dementia."* Additionally, the focus on separate phases seemed to generate a shift in importance towards more practically oriented sources of information like constructors, building material producers or quality labels and certificate providers.

In the first interview, the presence of different firms coloured the discussion. One participant explained: "*What do we look at as evidence? We have an internal library with reference projects, both our own and star projects. Sometimes we also organize visits to other projects with the client and things like that. […] We also have a database with evaluations of our clients, but also inside the firm, square metres, prices, ratios between programs.*" This firm clearly invests in post occupancy evaluations of their projects, focussing on both quantitative and qualitatively insights, thus working on a feedback loop and lifting those projects to the level of reference for future design projects.

Despite a different view on which information to use during design and how to collect it, both groups pointed at how collecting, processing, and evaluating information is an iterative process. This does not mean that the same information is used during each cycle, however. While refining a design from concept to actual building, architects oscillate between information content. On one hand this occurs between generally available information and information on the same topic specifically focused on the building's actual situation at its construction site, taking into account all other preconditions. General legal information such as building regulations or information on subsidies is often readily available on the internet, yet once you have an outline of an actual design, it is highly recommendable to engage in a dialogue with the particular (local) government to discuss the specific project. An example of a combination of clear rules and local decisions is fire regulation, as an architect explains: "*For example the law on fire regulation is a document that you find on the internet, that you almost have on your desktop.*" Another one continues: "*the law is one side, but you also have to talk with the government. It is not one against the other […] you will always have to visit you fire department so they can give advice. Therefore a conversation with the local department is very useful, whether or not they dare to divert from the norm.*" In the other interview, the risk of simply following regulations was addressed too. As someone put it: "*Actually it is funny that we build norms, we build norms in stone*."

On the other hand nuances are found between obligatory and inspiring information. One architect working on a large hospital project mentioned that a part of the building that is now used as a geriatric ward, was originally intended as a day hospital and designed according to the corresponding building regulation. Due to the original requirements the space is now way too big for the six patients residing there, therefore extra furniture was ordered and installed to fill up the space and create a more intimate atmosphere as intended in the concept for such a program. Still, this may not strictly be according to the regulations.

The participating architects almost unanimously pointed out that much information derived from research is far too abstract to be used while designing: "*It is mostly at the beginning that we, at our firm look for information that other architects might not look for. What we are missing is a link between architecture and […] how the building really operates.*" Later on in the interview this quote was further exemplified: *"[…] it is about how design decisions that have an influence on the maintenance, exploitation cost, and the operating cost. And the latter is very difficult to find, exploitation is easier.*" One of the architects gives another example: "*Running lines are very important in the health care sector because the cost of personnel is one of the biggest for the client. But those models that are the best concerning running lines, to find those in structured way to work with [is very difficult]. Of course, there are some logical starting points that everyone knows, a simple layout, but basic models to work with that I did not find yet."* As illustrated, the mutual influence of user perception, organisational structure, and cost implications is not explicit enough. This lack of explicitness combined with the nuances mentioned above, creates a considerable burden to find the desired information. Evidence from real, realized buildings could fill this gap. However, due to the time lapse between the design and use of many health care buildings, feedback loops risk to lack accuracy. Although most participants are convinced that research on specific topics or programs could be highly interesting during the design process, both groups pointed out that an important reason to make the effort of searching for it is to convince the client. It almost sounded as if the architects need the results only to convince others what they already know. Quotes like: "*that is also what you want to legitimate your choice with respect to the client*" were very common.

Finding the right information at the right time seems a challenge. The participants use the sources that are most ready-to-hand, like the internet or magazines. However, the choice of where to find information may also be generational: "*The way your find you information, I think, is also very generational. […] The three of us, we belong to … For us it may be a book or something like that, whereas with those youngsters, they find everything on the internet. They are faster, much faster, that is a real difference. And that is also why it is a good thing to be able to use different sources.*" The reliability of these sources is not always easy to trace. Generally speaking, participants seem to find it hard to evaluate what makes a source reliable or not. As mentioned: "*I find it hard to judge on the internet […] whether it is really someone's experience or just an opinion. That is also hard to derive from literature; you always have to interpret it. The best is to meet someone, who can say this are the advantages, this are the disadvantages.*" This someone then should have enough experience and authority, yet who is valued as an authority is not always clear. One stated: "*When you dub it with a voice from a documentary, it seems to increase the scientific value*." Sometimes surprising elements seem to provide an architect with a (false) feeling of reliability.

Introducing and Using Experiential User Data

After various data on patients' spatial experience were presented, strengths and weaknesses were brought forward. For both a distinction can be made between those relating to the data's content, type and use. Content wise the main advantage is found in the information's layered structure. An image that, at first sight, may just seem to show what a patient sees, can tell the spectator something about a different sensory experience or point at a relational malfunctioning when the underlying story is added (Annemans *et al.*, 2012a). One trainee formulated it as follows: "*Yes, I see the pictures and I especially hear the stories. Than actually how the subjective way of how the user sees it makes it interesting.*" A more experienced architect on the other hand states: "*The information of the story of that person is always at least as interesting as the conclusion connected to it.*"

How the information was communicated to the architects was largely appreciated. Directly communicating with raw data, avoiding (too much) analysis by researchers, allows architects to pick up aspects that are relevant to their specific design or situation. For

some, additional structuring would be welcome. The trainee continued: *"… maybe you can come to a matrix, that offers a structure to all the material, for example when you have a picture, objective [physical parameters], subjective, what the user says what is positive and negative.*" The additional video material reflected more closely the visual information architects would consult spontaneously. An architect said: "*If tomorrow there was a website with forty videos at different locations of someone who is wheeled through the hospital, I would definitely click on ten of them, and then maybe also the next ten, that would depend. But a way of documenting it in an a-typical way, that seems very interesting to me.*"

For the architects information in the design process in general, and experiential user data specifically, could mainly be used to convince clients. The participants claimed they currently have hard times convincing clients of the importance of experience related design decisions. Interventions aiming at an improved wellbeing of users in general, and patients in particular, now often have to lay thumbs against aspects that are easier to "prove" or easier to calculate. A partner at an architecture firm literally said: "*The biggest disadvantage of this kind of information is that it is very hard to calculate.*" They hope that the presented data could possibly provide a counter argument.

The above-cited strengths relate directly to the mentioned weaknesses. Some form their counterpart. A major threat to the layered structure of the data is the possible loss of part of the richness. Although some participants call the data subjective or too anecdotal, others consider the enormous amount of diverse testimonies as ideal to increase sensitivity without standardising or steering too much. Indeed, the architect who sincerely appreciated the videos later continued: "*[…] if we got something too concrete, we curse it."* However, when not communicated well, e.g., showing only images without the accompanying narratives, a lot of information gets lost, and misinterpretation lies in wait.

Discussion and Critical Remarks

The presented study was triggered by two research questions: (how) does the content, type, and use of information needed in different phases differ, and which (kind of) research results meet architects' requirements and how can they be communicated effectively? As to the former, the results of the focus group interviews suggest that each phase has its own specificities and corresponding information needs. Therefore, architects consult external advisors in each phase, besides those taking part in the entire design process. Although designing is an iterative process wherein questions concerning the same, more or less specific topics are addressed each round, the content, type, and use of the required information shifts. Whereas for some, often more technical topics, designers base their decisions in the first phases on generally available information and later enter into a dialogue with those doing calculations or formulating legal advice, for more experience- or user-related topics, the nuanced and particular is highly appreciated as an inspirational source from the start. In a very early phase participants mention engaging in real-life settings, reading blogs or watching movies with testimonies as a basis for their design. In later phases, this experiential user information becomes a frame of reference to check more punctual decisions. For example, the desire to design a homelike environment can serve as a framework to assess the choice of materials at a later moment.

Additionally, we examined to what extent and why the presented data match architects' informational requirements. As Chris McGinley and Hua Dong (2011, p.193) point out, "*There is a need to move away from the dry representations […] and to bring human information to life through presenting user insights as fuller stories, conveying liveliness through visual material, and giving scope for the design audience to complete the interpretations, allowing a level of co-ownership.*" The insights from the focus group interviews seem to address this need. As architects often feel mistrust towards data that already underwent a process of interpretation (Restrepo, 2004), our research provides the

opportunity to pass data directly from patients to architects (Annemans *et al.*, 2012a), offering the analysis as an addition rather than a result. Architects already working with experiential user information are looking for the stories underlying people's experience. By engaging, or reading or watching testimonies, they try to relate directly to particular users' personal stories. Although some criticize this approach as subjective and overly anecdotal, others value its richness. As the complementary of the layers was highly appreciated by the participating architects, a major part of the challenge will lay in finding a way of accessibly communicating the data without losing the layered content. A simple and reliable structure with an original viewpoint, presented through a channel architects are familiar with, like the internet, would be ideal.

Finally, we would like to make some critical remarks. As Nigel Cross (1982) points out, scientist almost unanimously conclude their analysis by stating that further research is needed. This is exactly what architects do not want to hear. They need hands-on information they can start working with. Endless refinements do not help to come to a physical result. As designers work in a solution oriented way (Cross, 1982; Rittel & Webber, 1973), they make a decision based on the best possible information available at a certain point. If that information is later refined or even contradicted, the proposed solution can be adapted depending on the phase or, if this is not possibly anymore, the knowledge gained could be transposed to a future project. Although one participant argued that the long time laps between projects makes learning from one for another hard, others indicated to still consider what they learn in one project valuable for the next.

A gap seems to exist between what architects expect from research and what research can provide. The participating architects want research data that provide them with concrete experiential user information, but also with a measurable outcome of implementing these data. However, as each problem is "essentially unique", despite a long list of similarities between a current and a previous problem, there might always be an additional distinguishing property that is of overriding importance (Rittel & Webber, 1973). Therefore, no research can ever provide architects with exact numbers on the outcome of a design solution and as such redeem the expectations.

While all participating architects expressed a need for (experiential user) information when designing, a significant difference was found between both focus groups. In the one conducted at one firm, a general agreement seemed to exist on the need for architects to support their clients with as much information as possible, even to the extent of taking over the entire reasoning underlying organisational decisions to support a client unable to take care of it him/herself. The other focus group raised the question how much information should come from architects. Many architects in the latter group seemed to consider a fruitful design one where the client takes the responsibility to provide information on the healthcare organisation and approach, whereas they as architects added spatial and technical knowledge to the process. Each party could then profile itself as an outsider in the knowledge field of the other and, from this position, question the other's assumptions in an unprejudiced way. A permanent dialogue between both parties would then shape the design process.

Conclusion

Both focus group interviews aimed to find out how architects currently use information in design, and how experiential user data could change their thinking about their projects and current way of working. Especially in the specific context of healthcare projects, which we focused on in our research, we noticed that architects are already aware of the importance of people's experience of the built environment. As people are often confronted with these buildings at a very vulnerable moment in their life, the societal relevance is never far away. A general consensus exists that these buildings' design can add to an evolution in the connotation that is assigned to them by the general public. Some architects believe their design can be a trigger to change entire organisations;

others only aim at improving patients' experience through punctual interventions or making their direct environment more convenient. Although the degree to which their responsibility stretches seems to differ across the participating architects, all feel, somehow, responsible for the outcome of their design. Despite different approaches to the design process, all seemed to value the presented data highly, as an introduction to an unknown experiential world, as a way to expand their horizon, or as means to convince their clients of the critical importance of aspects that are often difficult to prove.

Although architects may not appreciate the statement, more research is needed to gain profound insight in the use of these experiential data. In the presented study we were gauging for designers' interest in this kind of information and their preferences concerning type and accessibility. An interesting next step would be to observe whether and how the presented data are used in an actual design process. Do the participating architects practice what they preach? Only by following the coming into being of a building, starting from the conceptual phase and ending with a post occupancy evaluation, can we trace when and why which information is introduced, used, worked with, and finally also recognized or appreciated for its added value by the final user. Despite practical and time related burdens, such study would be worth investing in. Only by consciously collecting and structuring precise insights on the impact of experiential user information, will we, in the end, be able to shift architects' but also clients' focus to people's spatial experience.

Acknowledgements

Margo Annemans' research is funded by a PhD grant of the Baekeland program of the Agency for the Promotion of Innovation through Science and Technology in Flanders (IWT-Vlaanderen), which gives researchers the opportunity to complete a PhD in close collaboration with industry, in this case osar architects nv. Ann Heylighen received support from the European Research Council under the European Community's Seventh Framework Program (FP7/2007-2013)/ERC grant agreements n° 201673 and n°335002. The authors thank the participating architects, for sharing their time and insights. Also thanks to our AIDA collegues for their comments on an earlier version of this paper.

References

Annemans M., Van Audenhove, C., Vermolen, H., & Heylighen, A. (2011) Lying architecture. WELL-BEING 2011 Proceedings. Birmingham: Birmingham City University and the RIBA.

Annemans, M., Van Audenhove, C., Vermolen, H., & Heylighen, A. (2012a). Hospital Reality from A Lying Perspective: Exploring a Sensory Research Approach. In *Designing Inclusive Systems: Designing Inclusion for Real-world Applications*. Cambridge: University of Cambridge.

Annemans, M., Van Audenhove, C., Vermolen, H., & Heylighen, A. (2012b). What Makes an Environment Healing? Users and Designers about the Maggie's Cancer Caring Centre London. In *Proceedings of 8th International Design and Emotion Conference*. London.

Brandt, R. M., Chong, G. H., Martin, W. M., & American Institute of Architects. (2010). *Design informed driving innovation with evidence-based design*. Hoboken, N.J.: John Wiley & Sons.

Creswell, J. (2003). *Research design : qualitative, quantitative, and mixed method approaches* (2nd ed.). Thousand Oaks Calif.: Sage Publications.

Cross, N. (1982). Designerly ways of knowing. *Design Studies*, *3*, 221–227.

Cuff, D. (1989). The social art of design at the office and the academy. *The Journal of Architectural and Planning Research*, *6*(3), 186–203.

Hamilton, D. K. (2009). *Evidence-based design for multiple building types*. Hoboken, N.J: John Wiley & Sons, Inc.

Lawson, B. (1994). *Design in mind*. Oxford [England] ; Boston: Butterworth Architecture.

McGinley, C., & Dong, H. (2009). Accessing User Information for Use in Design. In *Universal Access in HCI* (Vol. Part I, pp. 116–125). Heidelberg: Springer Berlin.

McGinley, C., & Dong, H. (2011). Designing with Information and Empathy: Delivering Human Information to Designers. *The Design Journal*, *4*(2), 187–206.

Mortelmans, D. (2007). *Handboek kwalitatieve onderzoeksmethoden* (1e dr.). Leuven; Voorburg: Acco.

Restrepo, J. (2004). *Information Processing in Design*. Delft, The Netherlands: Delft University Press.

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, *4*(2), 155–169.

Lee S. H., Harada, A., & Stappers, P. J. (2000). Pleasure with Products: Design Based on Kansei. In *Proceedings of the Pleasure-Based Human Factors Seminar*. Copenhagen.

Schön, D. A. (1983). *The Reflective Practitioner*. New York: Basic Books.

Stewart, D. W. (2007). *Focusgroups: theory and practice* (2nd ed.). Thousand Oaks: SAGE Publications.

Ulrich, R., Zimring, C., Quan, X., Joseph, A., & Choudhary, R. (2004). *The role of the physical environment in the hospital of the 21st century: a once-in-a-lifetime opportunity*. Martinez Calif.: The Center for Health Design.

Zeisel, J. (2006). *Inquiry by design: environment/behavior/neuroscience in architecture, interiors, landscape, and planning* (Rev. ed.). New York: W.W. Norton & Company.

Zumthor, P. (2010). *Thinking architecture* (3rd, expanded ed.). Basel: Birkhäuser.

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